

## Scientific Conservation of Wooden Altars of Goa Churches – A Case Study

S. Vinodh Kumar<sup>1</sup>, M. Singh<sup>2\*</sup> & Nilesh E Mahajan<sup>1</sup>

<sup>1</sup>Conservation Research Laboratory, Ajanta Caves, Archaeological Survey of India, Padmapani Bhawan, Dr. BAMU Campus, Aurangabad – 431 002, India. <sup>2</sup>Department of Tourism Administration, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra 431004, India. Corresponding Author's Email: m\_singh\_asi@yahoo.com\*



DOI: <http://doi.org/10.38177/AJBSR.2022.4402>

**Copyright:** © 2022 S.Vinodh Kumar et al. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Article Received: 19 August 2022

Article Accepted: 26 October 2022

Article Published: 13 December 2022

### ABSTRACT

The wooden altars of Se Cathedral Church and Bom Jesus Church were having multiple conservation problems. The scientific conservation of the polychromy wooden altarpieces was successfully carried out. The accretions were cleaned with cotton absorbent using the mixture ethanol, iso-propyl alcohol with few drops of distilled water with non-ionic detergent. The wooden altars were also found damaged in some portions and the same were consolidated and the mending works in some places were also attended. The wooden altars around the St. Francis relics were severely affected by dry termite especially at lower parts that has almost been eaten away by termites. In many portions in the lower levels of altars there are holes, lacunas; cracks are noticed by the result of termites. The consolidation of wooden altars had already been carried out as follows. First, the entire wooden altar especially the damaged portions are being injected with 'Termiseal' and then the lacunas were being filled with the mixture of saw dust, wood putty, Araldite carpenter. Then the portions were matched with the surrounding colours. The anti-termite treatment of all the church complexes was also carried out in the step of preventive conservation. The environmental parameters were also studied and some precautionary measures to prevent the deterioration of wooden fabric by the relative humidity have also been recommended. Now, the wooden altarpieces are in good state of preservation.

**Keywords:** Polychromed wooden altarpiece; Conservation; Restoration; Environment; Relative humidity (RH).

### 1. INTRODUCTION

Old Goa or Velha Goa is a historical city that was constructed by the Bijapur Sultanate in the 15<sup>th</sup> century, it continued as capital of Portuguese India from the 16th century until its abandonment in the 18th century due to a plague. During the mid-16<sup>th</sup> century, the Portuguese colony of Goa, especially Velha Goa, was the center of Christianization in the East [1]. The Churches and Convents at Velha (Old) Goa owe their existence to the Portuguese rule in this part of the western coast of India.



**Figure 1.** General view of Basalica of Bom Jesus Church, Old Goa

The most comprehensive group of churches and cathedrals built during 16<sup>th</sup> to 17<sup>th</sup> century AD at Old Goa comprise of the following: Se' Cathedral, Church and Convent of St. Francis of Assisi, Chapel of St. Catherine, Basilica of

Bom Jesus; Church of Lady of Rosary; Church of St. Augustine. The Chapel of St. Catherine dating from 1510, the Church and Convent of Saint Francis of Assisi (which now houses the Archaeological Museum), and the Church of Bom Jesus where the mortal remains of St Francis Xavier rest, are some of the best in terms of design and style. Basilica of Bom Jesus (Figure 1) has a main altar, four side altars, two chapels, a sacristy and a choir. The richly carved main altar is dedicated to infant Jesus. Its facade is decorated with Ionic, Tuscan, Corinthian and composite pilasters show the application of classical orders. The added attraction of the church is the Chapel containing the relic of the body of St. Francis Xavier.

Se' Cathedral (Figure 2) is the largest church among the group. The church has besides the main altar eight chapels alongside the aisles and six altars in the transept. There is a long nave, two aisles and a transept. Architecturally the building is in Portuguese Gothic style; the exterior of the building is Tuscan and the interior Corinthian. The main altar is dedicated to St. Catherine of Alexandria. The richly gilded panel shows the martyrdom of the saint.



**Figure 2.** General view of Se' Cathedral Church, Old Goa

Polychrome wooden altarpieces are unique artifacts that combine a wide range of artistic, technical and material expression. Given their composition, function, and the nature of the physical and cultural contexts in which they are found, altarpieces comprise a very distinct category of cultural heritage. Created to transmit a religious message and cherished by churchgoers, these objects of devotion are now seen to embody a multiplicity of values. Their artistic and historic values have long been acknowledged. However, altarpieces are not only historic objects and works of art, but also important components of the religious and social life of a community and, potentially, focal points for social and economic development. The polychrome wood represents a distinct category of cultural heritage of universal value, which combine a range of artistic, technical and material expressions of human civilisation. The polychromy consists of one or more layers of paint, with or without a primer coat, which covers different elements entirely or partially in order to provide them a finishing or a decoration [2].

Conservation and restoration are necessary interventions to conserve and enhance the values of a cultural object and recover lapsed functions through the process. When defining a methodology for the intervention, one must “evaluate the alterations present, determining whether they consist of a simple patina or true disfigurations or destruction. This diagnosis must be based both on an objective knowledge of the evolution of the materials and

upon an idea we form about their original appearance, which in turn rests upon experience of works of art in their material and aesthetic reality" [3,4].

When it comes to specific interventions on altarpieces, restoration theory provides a framework of reference for decision-making. Restoration theory is applied from the start of the intervention project in order to prevent actions that could be detrimental to the objects. Whatever the degree of intervention, the conservator increasingly seeks out materials and methodologies that both respect the original material and condition of the piece of furniture and ensure reversibility of the added materials [5-9].

This study outlines the scientific conservation of wooden polychromed altarpieces of Bom Jesus Church and Se' Cathedral Church, Old Goa. The environmental parameters were also studied and some precautionary measures to prevent the deterioration of wooden fabric by the relative humidity have also been recommended.

## 2. POLYCHROME WOODEN ALTARPIECES

In order to document the aesthetic values embodied in the altarpiece's creation, research should be coordinated with other disciplines. Such an approach yields the most complete version of the prevailing aesthetic values that guided the altarpiece's builders and the process that led to its placement in that geographic region. The altarpiece's functionality should also be documented using an interdisciplinary approach, so as to better understand the information required for identifying how and for what purposes the altarpiece was built in that community. Understanding the needs behind an altarpiece being dedicated to a particular religious figure is insufficient. Documentation indicating what role the altarpiece played in fulfilling the aspirations and religious needs of the community with which it is associated during its second historical period is also needed.

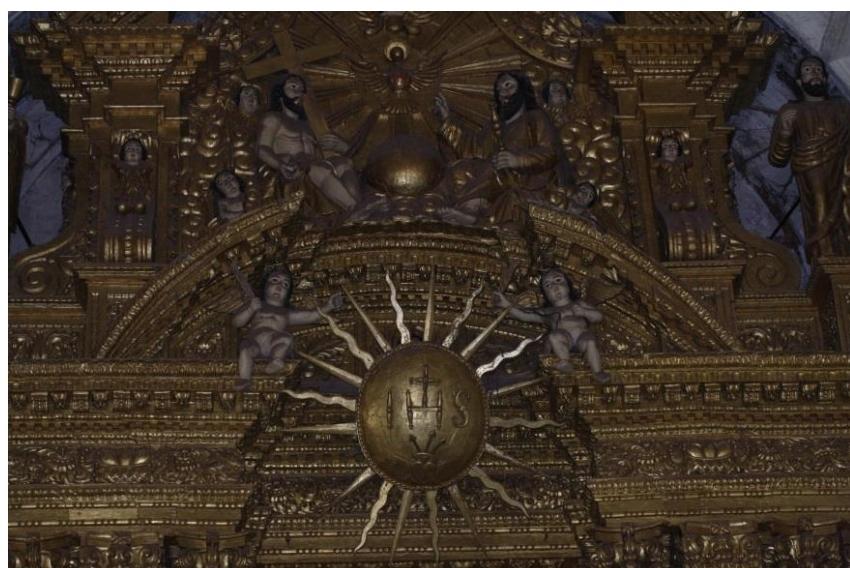
A detailed examination report needs to be prepared before to carry out any scientific conservation of the polychrome altarpieces/sculptures. The general information such as date, artist, culture, dimensions and identification marks of the altarpieces/sculptures were recorded. Then detailed photography was also carried out to study the condition of the polychrome sculptures/altarpieces. Visual as well as microscopic examination was also carried out. The details of wood, texture, ground, hardware used in original polychromy was also studied. Temperature and relative humidity (RH) inside and outside of the church were recorded in the regular interval of once in four hours a day for certain period.

## 3. CONSERVATION ISSUES

The techniques involved in the wooden polychrome altarpieces/sculptures are similar to that of panel paintings, therefore their conservation issues are often very similar to problems encountered with panel paintings. Over centuries, many wooden polychrome sculptures fell victim to unprofessional treatments such as primitive repairs, alterations, over-painting, and overgilding or were simply stripped of their decoration to reveal the bare wood. The painting and gilding decorations had been subjected to damage due to variations in the environment, and they had also suffered from the spontaneous actions of people throughout the years who had tried to make aesthetic improvements. Believing that they were improving the presentation of the altarpiece, they repainted and added several objects as they saw fit, which has made it harder to interpret the true values of the artwork. It was also necessary to evaluate the different interventions that had occurred over time due to acts of religious devotion.

Polychrome altarpieces, in addition to paint, very often contain gilding. Such complex, multilayered surfaces are extremely delicate and sensitive to many of the cleaning agents; therefore prior to any conservation treatment a comprehensive technical examination of wooden material, paint and gilded surfaces are necessary. As wood takes up water from humidity, it swells. As it loses water, it will shrink, sometimes dramatically. Both actions induce considerable stresses on the structure of the wood, resulting in irreversible warping or complete splitting of the wood section.

The conservation issues further noticed in the polychromed wooden altarpieces are deposition of thick coat of dust and dirt as the wooden altars were not cleaned for the last five decades (Figure 3). Insect activity was also noticed in some parts of the altars especially in the lower panels where St. Xavier's relic is being kept (Figure 4a and b). Powdering of wood and some of the alters had small voids, pits, and having insect activity. In many portions in the lower levels of altars there were holes, lacunas; cracks are noticed by the result of termites.



**Figure 3.** Deposition of accretions over the altars of Basaliica of Bom Jesus Church, Old Goa



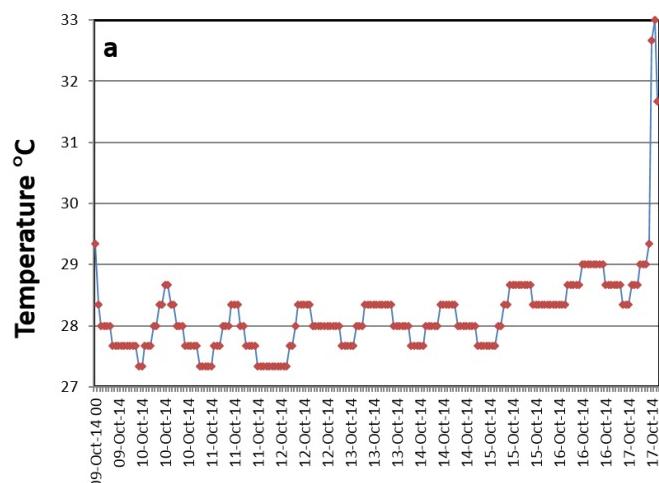
**Figure 4a.** Deterioration of Wooden altars of Goa Churches due to insect activity

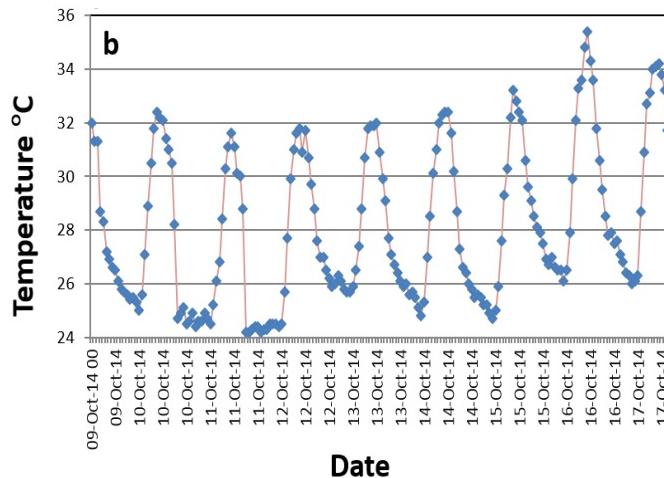


**Figure 4b.** Deterioration of Wooden altars of Goa Churches due to insect activity

Water which saturated the wood during the rainy season caused expanding in volume, and causing further cracking and delaminating. All the above mentioned processes have contributed may lead to the destruction of polychrome wooden altarpiece. The humidity level of Goa also has some adverse effect on the wooden altarpieces of the Churches of Goa.

Archaeological Survey of India has installed an automatic weather station in front of Se' Cathedral church in collaboration with Indian Space Research Organization (ISRO, Bangalore). This station records the surrounding temperature, relative humidity, wind speed, wind direction, rain fall and radiations at regular intervals. For monitoring microclimatic conditions inside the Church, an automatic Temp/RH data logger (Make: Oakton) was inside the Church. The temperature recorded inside Bom Jesus Church and outside the church is shown in Figure 5. From the graph it can be seen that the temperature range inside is 27°C to 29°C, which is almost 2 to 3°C lesser than that of the outside temperature. The temperature may not be affecting the polychrome wooden altarpieces. The reason for the difference in inside and outside temperature is may be the architecture of the churches.

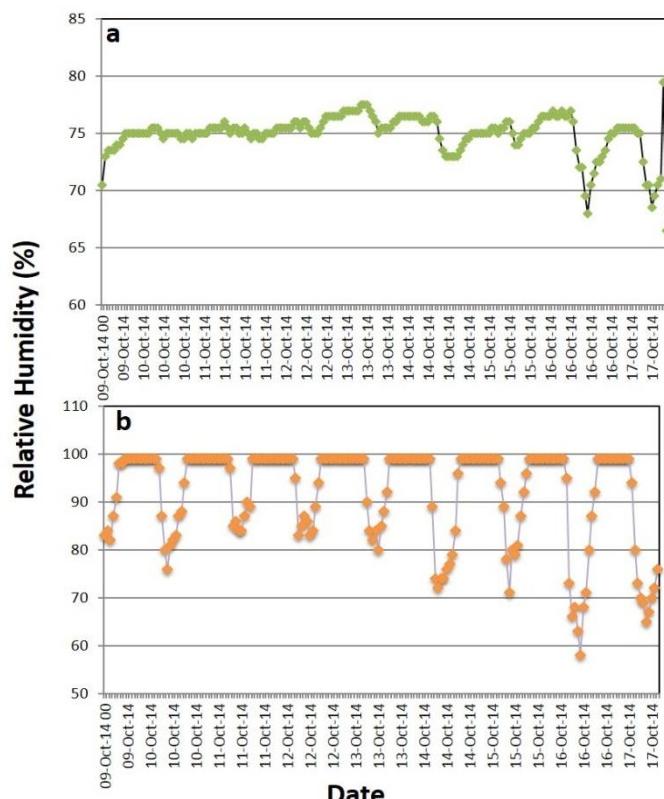




**Figure 5.** Temperature data recorded -

Inside (a) and outside (b) of Basillica of Bom Jesus, Church, Old Goa

Figure 6 shows the relative humidity (RH) recorded inside Bom Jesus Church and outside the church respectively. The humidity recorded outside the church is in the range of 80 to 100% whereas inside in the range of 70 to 80%. The difference in inside and outside humidity is due to the architecture of the church by laterite stone blocks. Still, the inside relative humidity is so high that of the recommended value of 50 – 55 %. The high humidity may be one of the factors for the deterioration of the wooden altarpieces. Huge number of tourists and devotees visits the Churches every day along with dust in their shoes is also one of the reasons for deposition of dust and dirt on the polychrome wooden altarpieces.

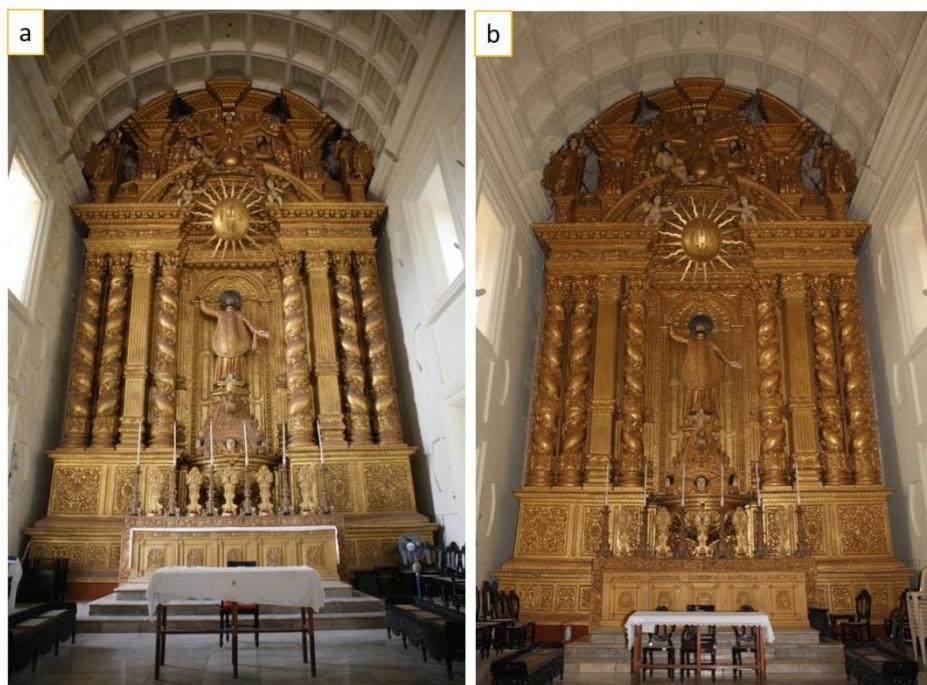


**Figure 6.** Relative humidity (RH) data recorded -

Inside (a) and outside (b) of Basillica of Bom Jesus, Church, Old Goa

#### 4. SCIENTIFIC CONSERVATION OF POLYCHROME WOODEN ALTARS

First up all, huge scaffolding was erected for execution of scientific conservation of polychrome wooden altars as they are huge in sizes. Then the general dusting was carried out using soft brushes and with the help of low pressure vacuum cleaners. Further, the accretions were cleaned with cotton absorbent using the mixture ethanol, iso-propyl alcohol with few drops of distilled water with non-ionic detergent. Here, few drops of water was used in the solution to make the soap solution effective. Finally, 2% Polyvinyl acetate (PVA) was applied as preservative coat. Figures 7-13 are showing the condition of wooden altars before and after scientific conservation.

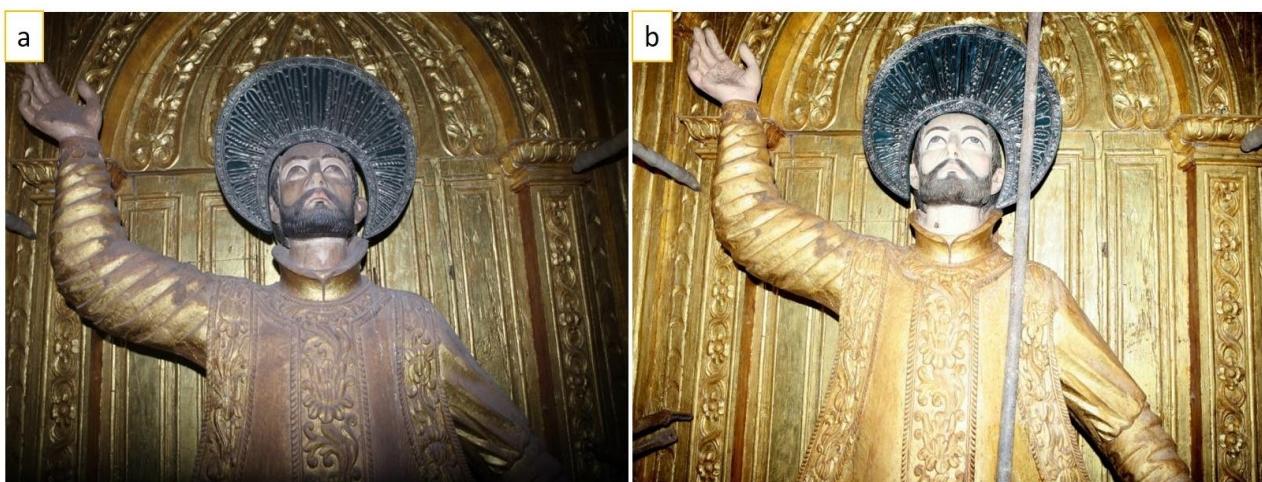


**Figure 7.** Main altar, Basalica of Bom Jesus Church, Before (a) and after (b) scientific conservation

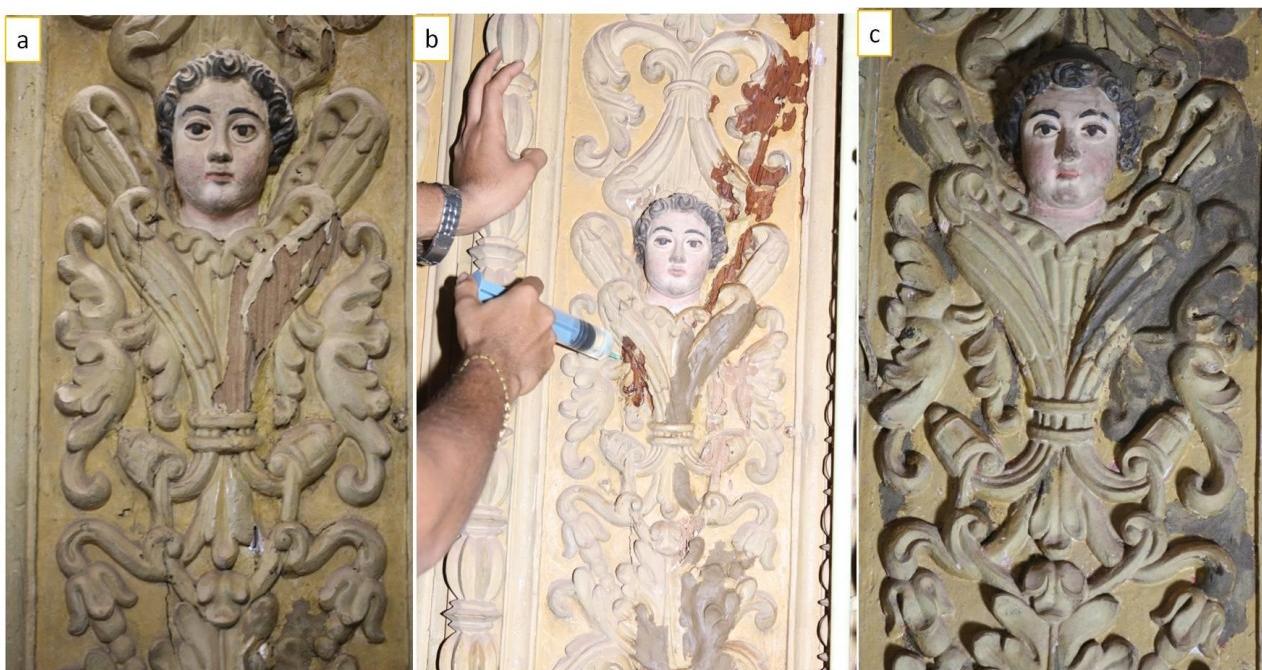


**Figure 8.** Main altar, Se' Cathedral Church, Before (a) and after (b) scientific conservation

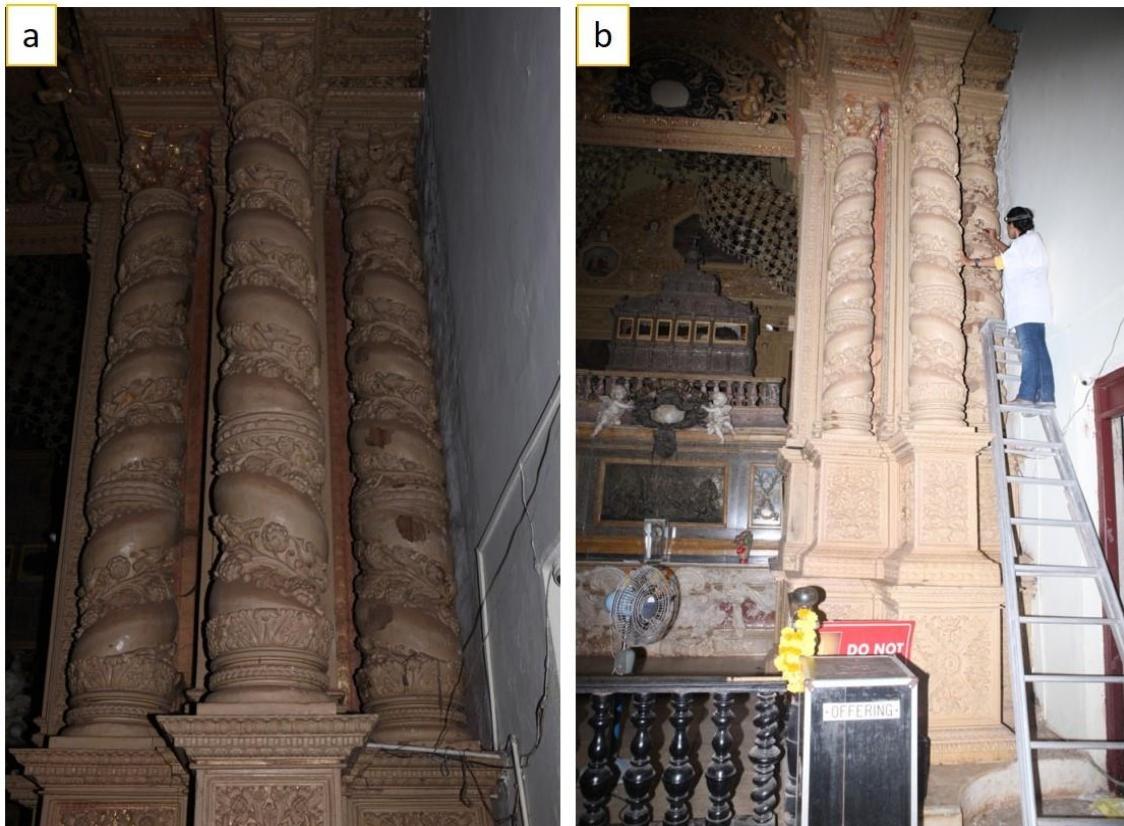
The wooden altars were also found damaged in some portions and the same were consolidated and the mending works in some places were also attended. The wooden altars around the St. Francis relics were severely affected by dry termite especially at lower parts that has almost been eaten away by termites. In many portions in the lower levels of altars there are holes, lacunas; cracks are noticed by the result of termites. The consolidation of wooden altars had already been carried out as follows. First, the entire wooden altar especially the damaged portions are being injected with ‘Termiseal’ and then the lacunas are being filled with the mixture of saw dust, wood putty, Araldite carpenter. Then the area was allowed it for complete drying. Then the portions were matched with the surrounding colours. The anti-termite treatment of all the church complexes was also carried out in the step of preventive conservation.



**Figure 9.** Polychrome Sculptures, Main altar, Basallica of Bom Jesus Church -  
Before (a) and after (b) scientific conservation



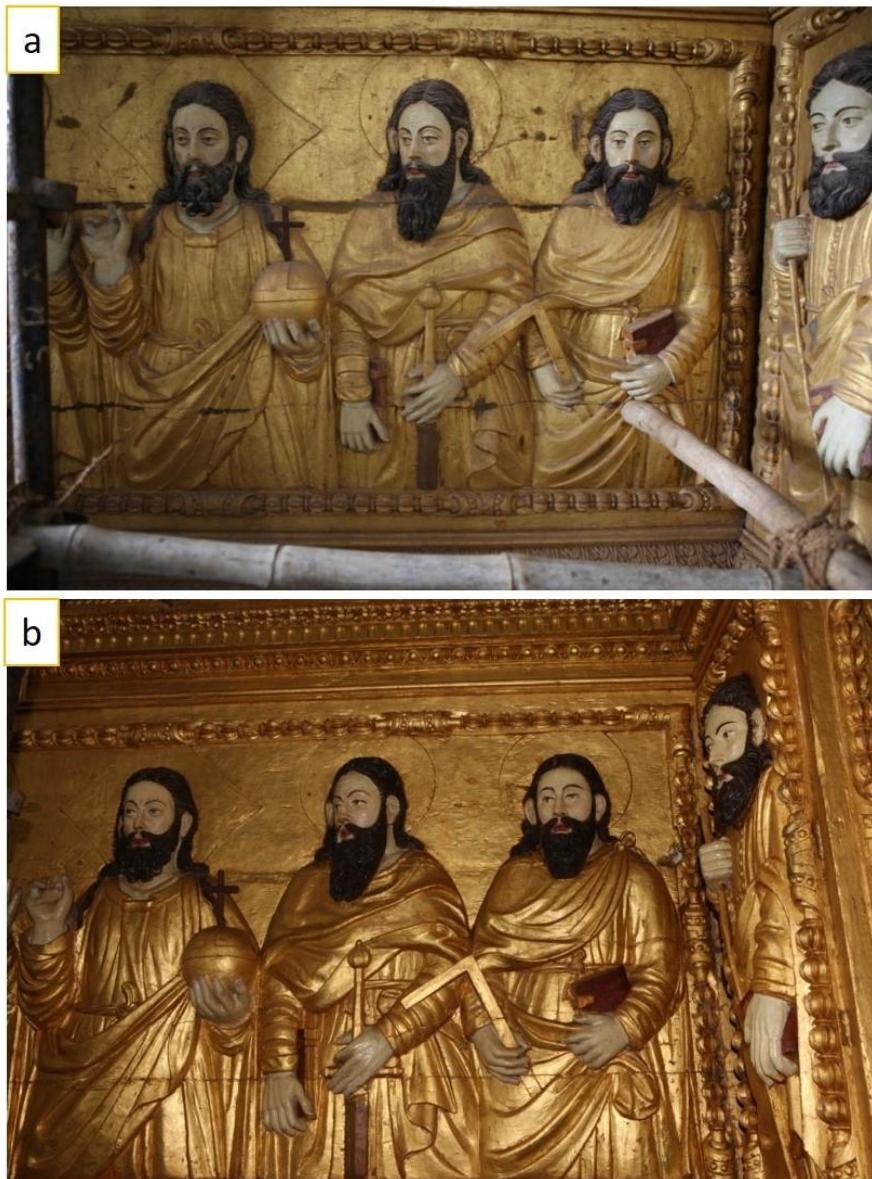
**Figure 10.** Polychrome altar, Basallica of Bom Jesus Church, Before (a), (b) during anti-termite treatment, and  
after (c) mending and consolidation work



**Figure 11.** Polychrome altar, Basallica of Bom Jesus Church,  
Before (a) and after (b) mending and consolidation work



**Figure 12.** Polychrome Sculptures, Main altar, Se' Cathedral Church,  
Before (a) and after (b) scientific conservation



**Figure 13.** Polychrome sculptures, Main altar, Se' Cathedral Church,  
 Before (a) and after (b) scientific conservation

Some of the windows and the doors of the Church are permanently closed. So, it is recommended to fit exhauster fans in the three windows of the walls to control the humidity. All three main doors of west side have to be opened during day time for air flow. These are some measures to control the relative humidity level inside the church.

## 5. CONCLUSION

The microclimatic conditions such as temperature and relative humidity inside and outside the church was recorded and studied. The relative humidity level inside the church is higher than the recommended level of 50–55% that may be the one of the factors for the deterioration of the wood. The measures for controlling inside the church have also recommended. The huge number of visitors with shoes is one of the factors for dust deposition over the altars of churches. The scientific conservation of the all the altars of Basallica of Bom Jesus Church and Se' Cathedral Church had been successfully carried out with utmost care. Now, the polychromy wooden altars are in good state of preservation.

## Acknowledgements

The authors are thankful to continued co-operation and support of the Director General and Director (Scientific Preservation) of Archaeological Survey of India and the same is gratefully recognized.

## Declarations

### *Source of Funding*

*This research did not receive any grant from funding agencies in the public, commercial, or not-for-profit sectors.*

### *Competing Interests Statement*

*The authors declare no competing financial, professional, or personal interests.*

### *Consent for publication*

*The authors declare that they consented to the publication of this research work.*

## References

- [1] De Mendonça, Délio (2002). Concept Publishing Company. ISBN 978-81-7022-960-5. Retrieved 2011-12-05.
- [2] García Ramos R, Ruiz de Arcaute Martínez E. (2001). La escultura policromada. Criterios de intervención y técnicas de estudio. Arbor: ciencia, pensamiento y cultura, 169: 645-676.
- [3] P.Philippot, (1996). Historical and philosophical issues in the conservation of cultural heritage, Readings in Conservation, Getty Conservation Institute, Los Angeles.
- [4] S. Bianchin, M. Favaro, P.A. Vigato, (2007). San Paolo del Vecchietta in the Museo Horne. 2. Diagnostic survey, Critica d'Arte, 69: 123-130.
- [5] A. Trochimowicz, (2010). Conservation of wooden sculpture of Saint Anne, Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology, 72: 382-385.
- [6] S. Kuckova, I.C.A. Sandu, M. Crhova, R. Hynek, I. Fogas, V.S. Muralha, A.V. Sandu, (2013). Complementary cross-section based protocol of investigation of polychrome samples of a 16th century Moravian Sculpture by optical, vibrational and mass spectrometric techniques, Micro chemical Journal, 110: 538-544.
- [7] N. Macchioni, G.M. Fachechi, S. Lazzeri, L. Sozzi, (2015). Timber species and provenances of wooden sculptures. Information from the collections of the National Museum of "Palazzo di Venezia" in Rome, Journal of Cultural Heritage, 16(1): 57-64.
- [8] S.N. Manrique Tamayo, J. Valcarcel Andres, J. Osca Pons, (2013). Applications of reflectance transformation imaging for documentation and surface analysis in conservation, International Journal of Conservation Science, 4(SI): 535-548.
- [9] I.C.A. Sandu, E. Murta, R. Veiga, V.S.F. Muralha, M. Pereira, S. Kuckova, T. Busani, (2013). An innovative, interdisciplinary, and multi-technique study of gilding and painting techniques in the decoration of the main altarpiece of Miranda do Douro Cathedral (XVII-XVIII<sup>th</sup> centuries, Portugal), Microscopy Research and Technique, 76(7): 733-743.